

Students' Perception towards Effectiveness of Technology Enabled Learning Environment at K-12
Level Based on Gender in Context to India

Turkish Online Journal of Qualitative Inquiry (TOJQI)
Volume 12, Issue 8, July 2021: 2390 – 2405

**Students' Perception towards Effectiveness of Technology Enabled Learning
Environment at K-12 Level Based on Gender in Context to India**

Dr. Rasna Sehrawat

Assistant Professor, AIE, AUUP , India

Abstract

Our study is unique in that it adopts theories grounded in instructional applications of educational psychology and instructional technology to gauge perceptions of module effectiveness across an effective sample of K-12 students. This study was intended to investigate students' perceptions of effectiveness of instructional approaches and ICT use, varies on the basis of gender differences. We hope our paper can contribute towards broader discussion of how education system can effectively and efficiently incorporate technology enabled learning environment (TELE) in K-12 classrooms catering gender differences. Students' knowledge of ICT tools and their perceptions of how these tools promote their learning are crucial for determining digital technology's added value in education settings. Past studies have found that male students are more comfortable in using technology for learning than do female students. Review of related literature also reflected that very few studies have examined these gender differences in the perception of using technology for learning. Research done in the field of effect of technology on learning is in its infancy stage though a great inclination of researchers can be seen towards detecting innovative pedagogical practice, patterns and educational trends incorporating technological tools. While there is much research done on integration of technology in education in two domains, specifically; learning outcomes and learners & teaching methodologies and teachers, still at India, education is a least technology –intensive enterprise. This exploratory study has been conducted with an aim to examine perceptions of K-12 students toward using technology (multimedia module) for learning on gender basis. Approach employed to investigate technology application in education in the current research is “contextually – specific” studying how particular technology function in certain environment. Accordingly, in an attempt to achieve our goal of this paper- the entire domain of technological applications is narrow

down to integration of multimedia module in classroom situation to develop technology enhanced learning environment and to perceive its effectiveness with respect to gender. The study has utilized a mixed methods approach to increase the validity and reliability of body of evidences. Quantitative and qualitative data were gathered utilizing questionnaire and focus group discussions respectively. Questionnaire was analyzed for perceptions on the use of technologies. Differentiation was made between perceptions of students based on gender using appropriate statistical procedure. Results are discussed in the light of instructional effectiveness and gender difference in technology use. The findings confirmed that there were statistically significant gender differences in all the scales of questionnaire in favor of males, thereby signifying gender imbalances towards technology enabled learning environments. Results showed a significant difference between the perceptions of males and females towards integration of ICT in classroom environment. Males were more inclined towards the usage of multimedia module for learning. Overall, the study provided an insight into how students perceive TELE. This study contributes in many dimensions for improvisation in educational settings. The study has developed multimedia module as an instrument to create technology enabled learning environment in school settings, thus contributing towards context of knowledge. Secondly, it provides insights supported with evidences how Multimedia module enhances student's learning. Thirdly, it shows how gender perception is associated with use of technologies for learning. Lastly, it has implications for policy makers and educationists as to question how to cater gender differences towards technological usage in learning environments. . It is recommended that these evident of the research can serve as a basis to develop policy frameworks for integrating ICT at K-12 level and shaping future e-learning strategies.

Keywords: Technology integration, Multimedia module, Gender differences, K-12 schools

Introduction: Comparative Education

Distinct conceptions and constructions of knowledge and various educational policies formulated by the authorities and influenced by social, political and academic developments, shapes the configuration and definitions of comparative education. With various advancements in educational practices, there is a need to structure comparative educational studies as intellectual inquiry and accept the comparative perspectives within various disciplines, practices and applications applied in educational setting. After being ostracized for several decades, comparative approaches are getting reaccepted as a method of intellectual inquiry, contributing towards field of research. "The renewed interest in comparative education is a consequence of a process of political reorganization of the

Students' Perception towards Effectiveness of Technology Enabled Learning Environment at K-12 Level Based on Gender in Context to India

world-space, calling into question educational systems that for centuries have been imagined on a national basis.”(Crossley, 2002)

With the beginning of 20th century, Comparative approaches as a method of intellectual inquiry is paving a way for development of various educational solutions through international tools and comparative indicators which can then be applied at global level. Various organizations are inclined towards forming a “comparative global enterprise” to frame “International educational indicators” so as to achieve Sustainable Development goals. Various researches are conducted using comparative methods in order to get additional resources, tools and methods to apply in the field as well as set of conclusions and required solutions for the field. Comparative studies conducted and published by organization like international association for the evaluation of educational achievement (IEA), Program for International Student Assessment (PISA) illustrates the importance of comparative studies and its implication for policy formulation. Their conclusions and recommendations tend to shape policies and guidelines globally on the basis of “international measures”. With this globalized acceptance of the results of these organizations, innumerable steps can be taken leading to improvisation of the educational structures of the nations.

Comparative Education & Integration of ICT in Education

Today an exponential growth of use of technology in education has raised the focus to examine the effect of technology enabled instructions on students learning. There is a growing interest in “design and development research” that examines the efficacy of computer based tools and products for application within specific contexts (Barab, 2006; Richey & Klein, 2008). In today’s scenario, the recent advancement and trends in educational policies all over the world is integration of ICT tools. The statement “we are all comparatists now” illustrates a global trend, in which one perceives ‘comparison’ as a tool to find ‘evidences’ and consequently entails the production of benchmarks. In saying this, we come to the heart of the paper: ‘Comparing perceptions of K-12 students toward effectiveness of Technology enhanced learning environment for learning on gender basis’. Approach employed to investigate technology application in education in the current research is “contextually – specific” studying how particular technology function in certain environment. Accordingly, in an attempt to achieve our goal of this paper- the entire domain of technological applications is narrow down to integration of multimedia module in classroom situation providing technology enhanced learning environment, to perceive its effectiveness with respect to gender.

As today's child is more inclined towards multi-sensory perspectives, education system should also incorporate this principle using multimedia as an instructional tool for learning thereby also providing an instructional situation which is learner centered and self-paced.

Instructional Theories employed in the development of module for the study are grounded in instructional applications of educational psychology and instructional technology to gauge perceptions of module effectiveness across a large sample of undergraduate students. Multimedia module developed in this study is based on Gagne's instructional design theory, information processing theory, Dual Coding theory, cognitive load theory and cognitive theory of multimedia learning. Multitude of multimedia researchers advocated Gagne's nine events of instructions. Instructional design model based on Gagne's nine events of instruction provides the investigator a list of events to be crosschecked before they engage in teaching –learning process. Each step signifies an outcome required for next step that aids learning process.

Research Question: In the direction to study the comparison of perceptions of k-12 students, the following **research question** was framed:

Whether perceptions of K-12 students toward effectiveness of Technology enhanced learning environment for learning differs on gender basis?

Purpose of the study:

“If we teach today as we taught yesterday, we rob our children of tomorrow.” (Dewey, 1916).

With change in time, with various developments, pedagogy of learning also needs a shift. Latest variable involved in all the fields putting noticeable impact is technology. It is the need of time to integrate technology efficiently in classroom settings developing process skills essential in knowledge society. Using technology, learning environment and learning resources should be developed providing opportunity of self- pacing and knowledge construction to students.

Various mission documents and commissions have recommended the involvement of ICT in classroom settings. Mission Document of National Mission on Education through ICT (2009) reported through SWOT analysis various weaknesses like growing digital divide and a very low percentage of digital literacy. “National Focus Group on Educational Technology (2006)”, recommended revitalizing and reorienting existing resources in the form of developing models for ICT enabled classes so as to help students develop “explanatory reasoning and other higher order

Students' Perception towards Effectiveness of Technology Enabled Learning Environment at K-12 Level Based on Gender in Context to India

skills". Revised ICT School Scheme, 2010 emphasized on "need to develop smart schools, where the emphasis would not only be on the use of Information Technology but also on the use of skills and values that will be important in the next millennium .It is hoped that at least one section (40 students) in each of the classes IX – XII will be fully computerized". Revised scheme also stressed upon "development of appropriate e-content to enhance the comprehension levels of children in various subjects." (As cited in Revised ICT School Schemes, Dept. of School Education and Literacy, MHRD, 2010) The draft of "National Policy on Information and communication technology in school education" (2012) emphasized that "computers and the Internet should not be used just as mere information delivery devices but to develop and deploy a large variety of applications, software tools, media and interactive devices and multimedia self-learning modules, thereby transforming classrooms into ICT Enabled classrooms". A good deal of evidences from research studies abroad revealed a positive effect of ICT integrated learning environments on student's learnings, but very less attention has been given on investigating the acceptability levels of genders towards technology as an instructional tool. The problem stems from the lack of research in Indian context regarding the perceptions of genders on the effects of multimedia modules when employed in learning environment. It is pertinent to develop multimedia module based on need assessment and study its perceived effectiveness at secondary school level on gender basis.

Objectives of the Study:

1. To study the perceptions of girls towards technology enhanced learning environment at secondary school level.
2. To study the perceptions of boys towards technology enhanced learning environment at secondary school level.
3. To compare the perceptions of boys and girls towards technology enhanced learning environment at secondary school level.

These research objectives provided a systematic plan to the researcher to select the population, sample, data collection procedures and tool development to investigate the research question.

Operational Definitions:

- **Effectiveness** was operationalized in terms of perception: Perceived effectiveness on the responses of the boys and girls during the implementation of the instructional strategy, instructional multimedia module.

- **Technology Enhanced Learning Environment (TELE):** A learning environment where technological tools are integrated in a classroom to support and facilitate learning.
- **Multimedia Module:** “application that uses multiple media like text audio, animations and graphics combined in a meaningful manner to convey information; packaged on CD-ROM. It is an application that combines all such media into an integrated package for effective transaction of content to learners”.
- **Gender:** Range of characteristics pertaining to, and differentiating between, masculinity and femininity.

Methodology:

This study has been conducted utilizing a mixed methods approach by using more than one method to gather evidence, more likely to provide more convincing and accurate information.

Qualitative data were obtained through the focus groups which provided rich subjective data on learners’ experiences and aided in developing and validating the learning environment instrument. Quantitative data was obtained using Questionnaire to seek perceptions of two genders for technology enhanced learning environment. Questionnaire was analyzed for perceptions on the use of technologies.

Procedure undertaken for conducting the present research is stated in steps as under:

Table 1.1: Steps undertaken to conduct the research:

Phase	S.No	Steps undertaken to conduct the research
PHASE- I Topic selection	1	Target group selected for focus group discussion
	2.	Consent from school administration for conducting discussion
	3	Focus group discussion-identification of hard spot (topic) for development of Multimedia Module
PHASE- II Tool Development	1	Development of Multimedia Module through focus group discussion.
	2	Self -Developed questionnaire to check perceived effectiveness of multimedia module with respect to gender
PHASE III Sample	1	Population- Total number of secondary English medium private schools affiliated to CBSE existing in Delhi.
	2	Sample size -227 students comprising of 111 boys and 116 girls in 3 different schools
PHASE- IV Pilot Testing	1.	Selection of a school other than selected for field testing
	2	Tools modified as per suggestions from experts
PHASE- V Experiment	1	Treatment groups –exposed to Instructional Multimedia Module
	2	Pre-test and post-test were administered on the two groups to investigate the effect of IMM on boys and girls.

Students' Perception towards Effectiveness of Technology Enabled Learning Environment at K-12
Level Based on Gender in Context to India

	3	Responses on the questionnaire to check perceived satisfaction of Multimedia Module were requested from the sample group.
Phase-VI- Analysis & Interpretation	1	Analysis and interpretation of the data collected from both the groups.

Experimental Design:

In this experimental design, the experimental group is self-selected based on participant's decision to implement the treatment of interest. Schools were selected on the basis of being highly similar on key variables like no ability grouping and student characteristics. The study utilized a Group Experimental Design (since investigation involved group of individuals) with a single variable design and further, Quasi-Experimental design of two independent groups of students in their intact form (no randomization of subjects) .In the study researcher had selected two groups, Treatment Group –I constituting of 111 boys and Treatment Group –II constituting of 116 girls exposed to multimedia module. Both the groups were tested prior to experimental manipulation and after experimental manipulation to measure the occurred changes in their perceptions towards ICT usage.

Sample:

The sample size for this study comprised of 227 students studying in three different schools, and having 111 boys and 116 girls constituting two treatment groups and was exposed to Multimedia Module.

Tools Used in the Present Research Study

In order to collect data from the sample group to conduct a research, following tools were developed:

- Focus Group Discussion for module development
- Self -Developed Multimedia Module to create TELE
- Self -Developed Questionnaire to investigate the effectiveness of Multimedia Module on perceived effectiveness of students on gender basis.

Development of Instructional Multimedia Module:

One of the primary objectives of the current study is to develop Multimedia Module. For development of MM, a process was followed based on principles for designing as discussed before in the text. The development task of module was undertaken by using the multimedia authoring process (MAP) (Neo & Neo, 1998) having a 3-stage procedure of pre-authoring, authoring and post-authoring stages. During pre-authoring stage, focus group discussion was held

to gather data from a set of participants to choose a topic for development of multimedia module and then based upon the responses a storyboard was developed for the topic chosen based on Gagne's nine events of instruction. For this, instructional system design was followed for maximizing the effectiveness and efficiency of content presented and reducing extraneous cognitive load. At authoring stage, Microsoft power point with adobe as an authoring tool was chosen to create the Multimedia Module integrating navigation, audio, animations and graphics. At post authoring stage, students were allowed to learn through Multimedia Module at their own pace exploring more information about content presented using navigational feature.

Development of Questionnaire to study the perceived effectiveness of Multimedia Module

The Questionnaire was developed to collect data from the students in an effort to investigate the effectiveness of multimedia module on gender basis when employed in teaching learning process. Evaluation was accomplished based on three domains namely: Conceptual Design, Graphic Design and User Perception. Individual questions were used as data collecting instrument to analyze all the criteria individually. The domain of conceptual design incorporates five criteria: introductory objectives and directions, navigation and orientation, interactivity, sequencing, and consistency with objectives and assessment. The domain of graphic design incorporates four criteria: textual graphic, visual graphic, sound graphics and mix of graphics. The domain of User's perception towards module covered issues such as experience about multimedia module, level of exposure multimedia module provided as compared to books and comparative self-learning. The questionnaire developed to investigate the perceived effectiveness of multimedia module was made available to students post-treatment.

Data Analysis:

At the initial stage the entry level of the sampled students for both the treatment groups were assessed for their perception towards ICT integration in classroom environment. Scores of both the groups were statistically analyzed involving comparison of mean ranks and Mann-Whitney U-test. Comparison of two conditions (pre-test and post-test) within the same group is also statistically analyzed applying Wilcoxon Signed Rank Test.

Students' Perception towards Effectiveness of Technology Enabled Learning Environment at K-12
Level Based on Gender in Context to India

Demographic Profile of the students

In the research study, out of total 227 students, 111 male students and 116 female students were considered as a part of two treatment groups .

Table 1.2:- Tabulation of Demographic Profiles of the participants

School			Total	
School A	Group	Treatment Group-I	46	72
		Treatment Group-II	26	
School B	Group	Treatment Group-I	20	78
		Treatment Group-II	58	
School C	Group	Treatment Group-I	45	77
		Treatment Group-II	32	
Total	Group	Treatment Group-I	111	227
		Treatment Group-II	116	
	Total		227	

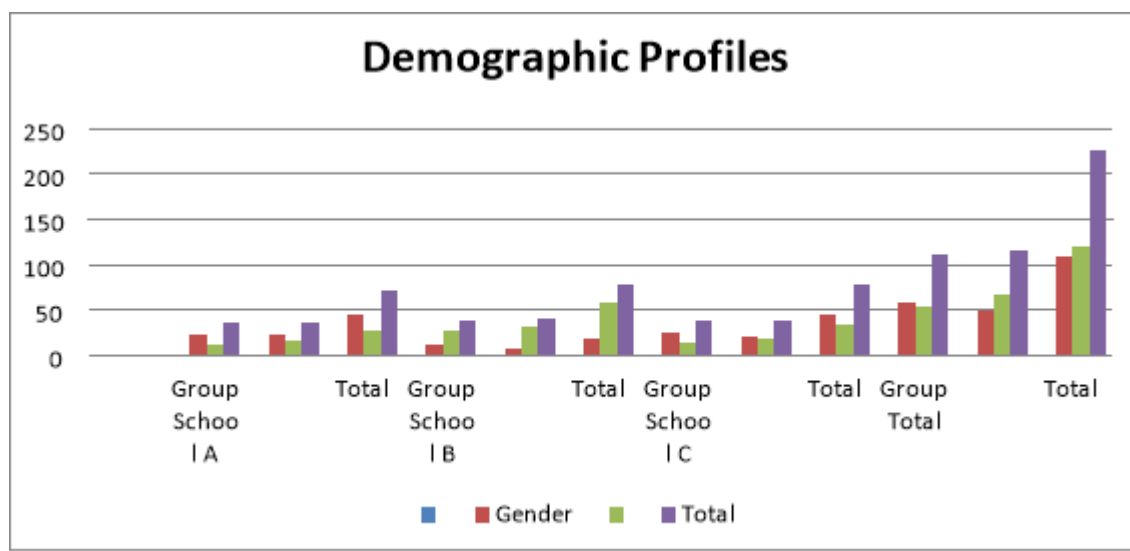


Fig 1.1: Cross Tabulation of Demographic Profiles of the participants

Thus the proportion of male and female are similar which helps in generalizing the results of the experiment on both the genders.

Entry level of the students for their perceptions towards ICT integration in classroom before intervention-

To test the difference between two conditions; experimental group and control group where different participants are used in both the conditions, Mann-Whitney U Test is used.

Table 1.3- Scores of both the groups at the initial stage of experimentation

Group	Interventions	Mean	S.D.	Mean Rank	Z	p-value	Significance
Treatment Group I(Boys)	Pre-test score	22.71	3.908	113.23	-.173	0.863	Insignificant
Treatment Group II(Girls)	Pre-test score	22.61	3.002	114.73			

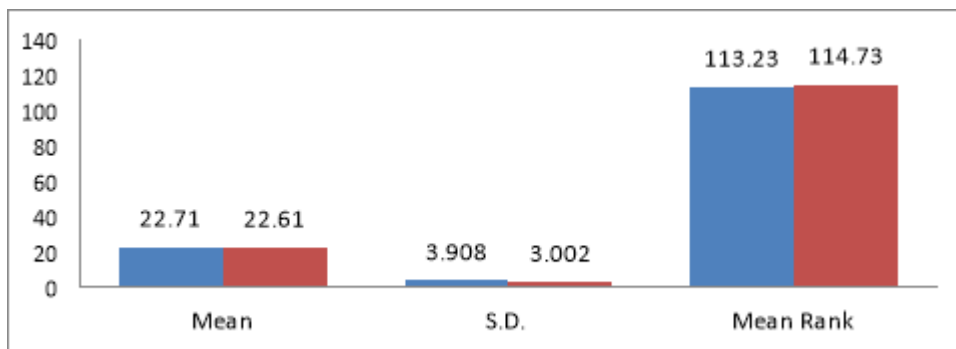


Fig.1.2 Graphical representation of scores for perception of both the groups at the initial stage of experimentation

At pre-test the mean scores for perception towards ICT integration of treatment group of boys and treatment group of girls are found to be 22.71 and 22.61 respectively, which is of negligible difference. As the table also depicts Mann-Whitney test is non-significant for pre-test with a probability value of 0.863 which is more than 0.05 concluding both groups report comparable level at initial stage.

Test of Statistical Significance between the two conditions (pre-test and post-test)

A) Treatment Group I-

Table 1.4-Comparison of mean ranks of Treatment Group-I at pre-test and post-test stage

Ranks							
Critical Thinking	N	Mean Rank	Sum of Ranks	Z	p-value	Significance	
Total post	Negative Ranks	0 ^a	.00	.00	-9.161 ^b	0.000	Significant

Students' Perception towards Effectiveness of Technology Enabled Learning Environment at K-12
Level Based on Gender in Context to India

perceptions --- Total pre perceptions	Positive Ranks	111 ^b	56.00	6216.00			
	Ties	0 ^c					
	Total	111					
a. Total post perceptions < Total pre perceptions							
b. Total post perceptions > Total pre perceptions							
c. Total post perceptions = Total pre perceptions							

The Table 1.4 provides the set of results obtained for Treatment Group-I, constituting of boys, exposed to Multimedia Module. This table concludes when students were exposed to Multimedia Module there was a significant increase in post test scores of perceptions of the boys as compared to their pre test scores signifying their acceptance of ICT integration in classroom settings.

B) Treatment group-II

Table1.5-Comparison of mean ranks of Treatment Group-II at pre-test and post-test stage

		Ranks					
		N	Mean Rank	Sum of Ranks	Z	p-value	Significance
Total post perceptions -- Total pre perceptions	Negative Ranks	0 ^a	.00	.00	-9.354 ^b	0.000	Significant
	Positive Ranks	116 ^b	58.50	6786.00			
	Ties	0 ^c					
	Total	116					
a. Total post perceptions < Total pre perceptions							
b. Total post perceptions > Total pre perceptions							
c. Total post perceptions = Total pre perceptions							

The Table 1.5 provides the set of results obtained for Treatment Group-II, constituting of girls, exposed to Multimedia Module. This table concludes when students were exposed to Multimedia Module there was a significant increase in post test scores of perceptions of the girls as compared to their pre test scores signifying their acceptance of ICT integration in classroom settings.

Test of Statistical Significance between the two independent groups-Treatment Group I & Treatment Group -II

For Comparison of mean ranks at post test of Treatment group-I and Treatment group-II, Mann-Whitney U test was applied.

Table1.6-Comparison of mean ranks at post test of Treatment group-I and Treatment group-II

Ranks				
	Group	N	Mean Rank	Sum of Ranks
Post-test	Treatment group-I	111	162.33	18018.50
	Treatment group-II	116	67.75	7859.50
	Total	227		

The Table 1.6 summarizes the data after they have been ranked. It tells the average and total ranks in Treatment group-I and Treatment group-II at post test is 162.33 and 67.75 respectively. This infers, treatment group –II with lower mean rank is the group with greatest number of lower scores in it and treatment group-I with higher mean rank has greater number of high scores in it.

Table 1.7- Test Statistics

Test Statistics		
	Pre-test	Post-test
Mann-Whitney U	6353.000	1073.500
Wilcoxon W	12569.000	7859.500
Z	-.173	-10.868
Asymp. Sig. (2-tailed)	.863	.000

The Mann-Whitney and Wilcoxon Rank statistics for the post-test observations is found to be 1073.500 and 7859.500 respectively. The results conclude that, perceived effectiveness of Multimedia Module in treatment group-I is found to be significantly better than treatment group-II.

FINDINGS:

Results showed a significant difference between the perceptions of males and females towards integration of ICT in classroom environment. Males were more inclined towards the usage of multimedia module for learning. Overall, the study provided an insight into how students perceive TELE.

Students' Perception towards Effectiveness of Technology Enabled Learning Environment at K-12 Level Based on Gender in Context to India

Investigation of Perceived effectiveness of Multimedia module was accomplished based on three domains namely: Conceptual Design, Graphic Design and User Perception. The results of first domain –conceptual design; indicated multimedia module provided specific introductory objectives with their predefined purpose and also used previous knowledge to stimulate learning process. It also allowed students to access information and seeks extra help. In terms of interactivity, multimedia module is user friendly and self- paced providing individual attention to the students with an opportunity of feedback and guidance thereby enhancing retention and transfer of the knowledge in daily life. The results also indicated, that content in the module was sequentially arranged with an average difficulty level and in coherence with the objectives defined. When the results for graphic design were evaluated, it indicated that the language used in the module was appropriate and typography was compatible. Also the mix of graphics in terms of quality of images and sound used was found to be appropriate by the students. Some of the students experienced module to be time consuming whereas maximum perceived it to be an easy mode of learning. There were statistically significant gender differences in all the scales of questionnaire in favor of males.

Significance of the study:

This study contributes in many dimensions for improvisation in educational settings. The study has developed multimedia module as an instrument to create technology enabled learning environment in school settings, thus contributing towards context of knowledge. Secondly, it provides insights supported with evidences how gender perception is associated with use of technologies for learning. Lastly, it has implications for policy makers and educationists as to question how to cater gender differences towards technological usage in learning environments.

Suggestions for Further Researches:

- A study can be undertaken to study the attitude of students and teachers towards use of instructional multimedia module as instructional tool in classroom settings.
- A study can be undertaken to study perceptions of students towards ICT integration at higher education level.
- A study can be undertaken to compare the student's perceptions towards ICT integration with respect to socio-economic background.
- A study can be undertaken to compare the student's perceptions towards ICT integration with respect to geographical backgrounds.

REFERENCES

1. Agnew, P. W., Kellerman, A. S., & Meyer, J. (1996). *Multimedia in the classroom*. Boston: Allyn and Bacon.
2. Belinda Soo-Phing TEOH and Dr.Tse-Kian NEO(2007),*Interactive multimedia learning: students' attitudes and Learning impact in an animation course*,The Turkish Online Journal of Educational Technology – TOJET October ISSN: 1303-6521 volume 6 Issue 4 Article 3
3. Best, J. W., & Kahn, J. V. (2003). *Research in education* (9th Ed.). Boston: Allyn and Bacon.
4. Bialo, E., and Sivin, J. (1980) *Report on the Effectiveness of Microcomputers in Schools*. Washington, DC: Software Publishers Association.
5. BT (2007) *.Education in India: Case Study*. British Telecommunications plc.
6. Campbell, D. & Stanley, J. (1963). *Experimental and quasi-experimental designs for research*. Chicago, IL: Rand-McNally.
7. Center for Knowledge Societies (2003), *Rapid Assessment of ICTs for Education*. EDC. Education for All: National Plan of Action, India.
8. Crozat, S., Hu, O., Trigano, P., (1999)."A Method for Evaluating Multimedia Learning Software", IEEE International Conference on Multimedia Computing and Systems, Vol. 1, Florence, Italy. pp. 714-719.
9. Debus M. (1988). *A handbook for excellence in focus group research*. HEALTHCOM Project special report series. Washington, D.C: Porter/Novelli.
10. De Cecco, John P., and Crawford, William R. (1974). *The Psychology of Learning and Instruction*. Educational Psychology. New Jersey: Prentice-Hall, Inc., Englewood Cliffs.
11. Faryadi,Q.(2012).*The architecture of Interactive Multimedia Courseware : An Empirical-Based Approach: Phase Two*. International Journal of Humanities and social science, vol.2 (15).
12. Gagné, R.M. (1985). *The Conditions of Learning and Theory of Instruction (4th Edition)*. New York: CBS College Publishing.
13. Gagne, R.M., Wager, W., Golas, K.C. & Keller, J.M. (2005). *Principles of Instructional Design (4th ed.)*. Belmont, CA: Wadsworth/Thompson Learning.
14. Haddad, W. & Jurich, S. (2002). *ICT for education: potential and potency*. In W. Haddad and A. Drexler (eds). *Technologies for education: Potentials, Parameters, and Prospects*. Washington, DC: Academy for Educational Development and Paris, (UNESCO), pp.28- 40.
15. Hawkins, R. (2002). *Ten Lessons for ICT and Education in the Developing World*. World Links for Development Program The World Bank Institute. pp.38-43.
16. Kennedy, G., Petrovic,T,& Keppell ,M.(1998)*The development of multimedia evaluation Criteria and a program of evaluation for Computer aided learning*, Ascilite.
17. Killi,K.(2005).*Participatory multimedia learning: Engaging learners*. Australian Journal of Educational Technology,vol.21(3).
18. Kozma, R. B. (1991). *Learning with media*. *Review of Educational Research*, 61(2), pp. 179-211.
19. Laurillard,D.(1995). *Multimedia and the changing experience of the learner*. *British Journal of Educational Technology*, vol.26 (3).

Students' Perception towards Effectiveness of Technology Enabled Learning Environment at K-12
Level Based on Gender in Context to India

20. Laurillard, D. (2002). *Rethinking teaching for the knowledge society*. EDUCAUSE Review January/February 2002. <http://net.educause.edu/ir/library/pdf/erm0201.pdf>.
21. Luann K. Stemler. (1997). Educational *Characteristics of Multimedia: A Literature Review*, JI. of Educational Multimedia and Hypermedia 6(3/4), pp.339-359.
22. MHRD (2012). *National policy on information and communication technology (ICT) in school education*. New Delhi: Department of School Education and Literacy Ministry of Human Resource Development, Government of India.
23. MHRD (2010). *Revised ICT School Schemes*. Dept. of School Education and Literacy, Ministry of Human Resource and Development, Government of India.
24. MHRD (2009). *National policy on information and communication technology (ICT) in school education*. New Delhi: Department of School Education and Literacy Ministry of Human Resource Development, Government of India.
25. Mishra, Sanjaya and Sharma, R.C. Eds, (2005). *Interactive Multimedia in Education and Training*. IDEA Group Publishing: Hearshey, USA ISBN: 1591.pp.403-94.
26. Moreno, R. and Mayer, R. E., (2000). *A learner-centered approach to multimedia explanations. Deriving instructional design principles from cognitive theory*. Interactive Multimedia Electronic Journal of Computer-Enhanced Learning, 2(2).
27. Najjar, L.J.(1996). *Multimedia information and learning*, Journal of Educational Multimedia and Hypermedia, 5(1), pp.129-150.
28. NCTE(2009) *National Curriculum Framework for Teacher Education -Towards Preparing Professional and Humane Teacher* ,National Council for Teacher Education, New Delhi, Government of India.
29. Neo, M., & Neo, T.K (1998). *Authorware: The Multimedia Icon*, Subang Jaya: Meway Computec Sdn. Bhd., Malaysia.
30. Neo, M & Neo, T. K. (2000). "*Multimedia Learning: Using multimedia as a platform for instruction and learning in higher education*". Proceedings of the Multimedia University International Symposium on Information and Communication Technologies 2000 (M2USIC'2000), Kuala Lumpur, Malaysia.
31. Neo, M., Leow, F.T. & Neo, T.K. (2011). *Developing an Interactive Multimedia-Mediated Learning Environment Using Gagne's Nine Events of Instruction in a Malaysian Classroom*. International Journal of Instructional Media (IJIM), 38(4), pp. 379-389.
32. Neo,K.& Kian,T.(2003).*Using multimedia in a constructivist learning environment in the Malaysian classroom*, Australian Journal of Educational Technology,vol.19(3).
33. Paivio, A. (1991). *Dual Coding Theory: Retrospect and Current Status*. Canadian Journal of Psychology, 45(3),pp. 255-287.
34. Paul,P.K.&Mondal,N.K.(2012).*Integration of ICT in school Education: An Analytical Study in Burdwan District in West Bengal*. Research Journal of Management Sciences,Vol.1(4).
35. Perzylo,L.(1993).*The application of multimedia CD-ROMs in schools*. British Journal of Educational Technology,vol.24(3)
36. Position Paper, (2006). *National Focus Group on Educational Technology* National Council of Educational Research and Training.
37. Prabhu Shankar,S.(2010).*Instructional Designing: A Prospective Career*. University News, vol.48 (20).

38. Reigeluth, C. M. (1999). *Instructional Design theories and Models, Vol. II, A New paradigm of instructional theory*, Indiana University, London: Lawrence Erlbaum Associates Publishers.
39. Sivin-Kachala, J. & Bialo, E. (1996). *Report on the effectiveness of technology in schools, 195-196*. Washington, DC: Software Publishers Association
40. .Tan, H.Y.J., Kwok, J.W.J., Neo, M. & Neo, T.K. (2010). *Enhancing student learning using multimedia and web technologies: Students' perceptions of an authentic learning experience in a Malaysian classroom. Proceedings of ASCILITE - Australian Society for Computers in Learning in Tertiary Education Annual Conference*. pp.951-962
41. Theng, L. (2011). *Designing a Multimedia-mediated Student-centred Learning Environment (MMSLE) with Gagne's 9 Events: Students' Perceptions*. International Conference on Life-Long Learning (ICLLL 2011) Retrieved from-[http://iclll2011.oum.edu.my/extfiles/pdf/Designing a Multimedia-mediated Student-centred Learning Environment \(MMSLE\) with Gagne%92s 9 Events Students%92 Perceptions.pdf](http://iclll2011.oum.edu.my/extfiles/pdf/Designing_a_Multimedia-mediated_Student-centred_Learning_Environment_(MMSLE)_with_Gagne%92s_9_Events_Students%92_Perceptions.pdf)
42. Victoria L. Tinio (2000-2002), *ICT in Education*, United Nations Development Programme, Bureau for Development Policy, New York.
43. World Bank (2009). *Secondary education in India: Universalizing Opportunity*; Human Development Unit South Asia Region. The World Bank.
44. World Summit on the Information Society (2008). *Why a Summit on the Information Society* ". International Telecommunication Union.